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Seed Financing for Early Stage Ventures firms from an organizational resource perspective

MSc in Innovation and Entrepreneurship

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Abstract

It's the objective of this research to empirically identify the effect of some of the firm resources on seed capital acquisition within early stage research based startups. This research uses 10 propositions to identify some of the fundamental resource combination to financial resource accumulation.

Based on the resource theory, this research empirically tests for the effect of team atmosphere, team education, entrepreneurial leadership experience, cooperation with competitors, patents, commitment of entrepreneurial team and functional diversity on team likelihood of obtaining seed capital. Contrary to existing literature, this research finds that functional diversity of the entrepreneurial team is least likely to guarantee financial resource accumulation. This research further finds that firms able to nurture a combination of social, human and technological capital are more likely to acquire seed capital thereby affirming that process of bootstrapping firm resources is socially complex, tacit and path dependent.

DECLARATION

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Dedication

For their continued encouragement and advice, I wish to dedicate the efforts put into this research paper to Mr. and Mrs. John Chrysostom Kalyango Mwanje of Rakai , Uganda.

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Abbreviations

SME	—	Small and Medium Enterprises
VC	-	Venture Capital
TMT	-	Top Management Team
NCE	-	Norwegian Center of Expertise
ADITEC	-	Advanced Immunization Technologies
R&D	-	Research and Development
DIP	-	Designrevet Innovasjonsprogram

1.0 INTRODUCTION

There is growing appreciation of the role of small and medium enterprises (SMEs) in the economic development of nations and as a result Governments across the world have instituted a number of policy measures aimed at accelerating SME growth. Governments have tried to further establishment of new startups through policy instruments inclined to science and innovation policy like innovation grants, research grants, technology incubators, business support services, technology awards, job creation grants etc, towards firms with commercial potential especially research based startups. These schemes highlight some of the challenges faced by startup ventures like financial gap, geographical location, access to business development support services especially research facilities, strategic planning etc. As such government avails public funds towards SME development. Its important to note that new SMEs not only create jobs, but also, foster economic flexibility, stimulate industrial reorganization, and enable social mobility (Brüderl, Preisendörfer et al. 1992).

Startups by disposition are young (sometimes referred to as liability of newness) and small (liability of smallness) entrepreneurial ventures within industrial or business setting often characterized by limited knowledge of environment, employee inexperience or lack of commitment, limited approval by customers and suppliers and untested operational routines and procedures. These uncertainties are compounded by the fact that research based startups are often engaged in “new technology” which by its very nature is uncertain, without a developed market segment, very fast obsolesce and yet still requires substantial financial investments for its development and product commercialization (Tushman and Rosenkopf 1992; Aldrich and Fiol 1994).

Research-based start-ups are new business start-ups that develop and market new products or services based on a proprietary technology or skill (Heirman and Clarysse 2007). They are by definition drivers of research, development and innovation. New research based enterprises in their very nature are a creation of prospective entrepreneurs academic or otherwise with often limited understanding of business and industrial environment within which his/ her breakthrough will operate. This has in effect created a new challenge for academic and entrepreneurial scholars on how to integrate the innovation and entrepreneurship into the education and research curriculum.

1.1 Research Question

Given the predicament faced by early stage entrepreneurial ventures especially technology based, government policy makers are increasingly devising strategies to enhance and encourage institutional researchers into commercialization of research findings. One of the most evident dilemmas encountered by aspiring prospective entrepreneurs is the magnitude of financial resources necessary for the innovation and eventual exploitation of new research and technology. This phenomenon has been classified by many researchers as financial gap. This apparently due to high risks associated with ‘new technology’ and information asymmetries between resource holders and prospective entrepreneurs. Financial gap, according to Clarysse, Wright et al. (2007), is the elevated need for finance in early stage venture firms and is a result of the existing information asymmetries and transaction costs associated with investing in startups. Some research has shown that governments, through a variety of public funding schemes, are most important source of finance for early stage venture firms (Wright, Lockett et al. 2006).

Because new prospective entrepreneurs that develop novel innovations may not have the cognition to identify business opportunity and resources to commercialize their discoveries in a market place and as such ‘surrogate entrepreneurs’ may be sought to mentor them (Franklin, Wright et al. 2001). These surrogate entrepreneurs can be business angels or venture capitalists with experience not necessarily in the science of the technology but in business development, strategy and financial expertise.

In the entrepreneurial setting, financial intermediaries such as business angel and venture capital (VC) firms act as scouts – identifying future trends in technologies and market and as coaches – fostering the development technology and commercialization of new products (Baum and Silverman 2004). Ideally, financial intermediaries will invest in startups that have strong proven or prospective technology with a high risk of failure - for the short term (Baum and Silverman 2004). As a result financial intermediary firms have developed time tested firm selection templates – or rather due diligence strategies which systematically incline them towards financing startups conveying distinct characteristics predictive of future success – these are the firm resources. In this research paper, I attempt to answer the question, *‘How do firm resources influence a new entrepreneurial venture’s probability of obtaining seed capital?’*

1.2 Research Objective

At founding, entrepreneurs endow the firms they create with certain resources with some researchers positing that a firm's initial resource stocks may have enduring effects on firm performance. The firm's outcomes are influenced by new ventures' human capital endowments, their stocks of technical assets, relationship between entrepreneurs' social capital and the environmental and market conditions at the time of founding (Shane and Stuart 2002). The firm's initial resource endowments that is the stocks of resources that entrepreneurs contribute to their new ventures at the time of founding will affect its likelihood of accessing seed financing and/ or venture capital financing at later stages of development and consequently, the subject of early stage venture financing is of significant interest to entrepreneurial research. Entrepreneurs and entrepreneurial ventures as a result of the assets (technological, human and organizational) available and implementation strategies and practices adopted, vary at founding, and consequently, have to compete for the limited resources – seed capital from the a few financial intermediaries and Government innovation driven institutions. Freeman and Soete (1997) assert that resource mobilization for new venture formation is an undertaking laden with uncertainty and unforeseeable hazards for the reason that the quality of a new venture is always a matter of debate. *'It's the objective of this research paper to try and identify key firm resource endowments fundamental to seed capital acquisition.'* In my analysis, I study the influences of social capital, human capital, and technological resources on the subsequent acquisition of seed finance.

1.3 Justification

An exemplification of the correlation between firm resources and seed capital acquisition by new research based startups for the purpose of this research is substantiated by three Norwegian technology based startups. An assessment of their initial firm resources directs this research to some fundamental firm endowments that may be critical to addressing the predicament faced by the majority of startups especially research based and that is, the financial gap. The findings of the resources endowments of Startup Alpha, Gamma and Beta are elaborated below:

Startup Alpha was founded in 2006 as a spin off of a Norwegian telecom giant's research and innovation department. Alpha is an IT based venture with focus on search technology and

network analysis. The development of its core technology dates back to 2003 in research lab of Norway's Telecom giant. Alpha employees 6 staff and reports to have received both seed and venture capital and yet it is entirely owned by its employees. Search about the company indicates that both its Chief Executive and Chief Technology Officer are Master graduates of Computer Science at the University of Oslo. The Chief Executive in particular has a prior founding experience within IT business. Alpha currently has three enterprise products on market and reports to have realized break even in 2009.

Startup Gamma was founded in 2005 and is located within *Energiparken*, a science park in Stavanger. Gamma is focused on integrated environmental monitoring with diverse application to Oil and Gas sector. Search at the Norwegian Industrial Property office database returns three patent pendings. Gamma has received seed capital and only recently won a grant from the Norwegian Design Council through its *Designrevet Innovasjonsprogram* (DIP). Gamma has affiliations to Norwegian Center of Expertise (NCE) Subsea and was recognized as the emerging firm in 2010 for its innovative and revolutionary technology. Gamma employs three persons supported by a board comprising of experienced academic and industrial experts in the field of oil and gas, energy and environmental science, and corporate finance.

Startup Beta was founded in 2007 as an academic spin off of the University of Oslo and Oslo University Hospital. Beta is biotechnology startup developing a proprietary platform of novel vaccines. Beta is located in *Forskningsparken* - a science park at the University of Oslo and has affiliation to Oslo Cancer Cluster, Norsk Industri, Norwegian Centre of Expertise (NCE) *Legemiddelindustrien* and is currently undertaking collaborative research with Advanced Immunization Technologies (ADITEC). Beta has received seed capital but not venture capital and has an investment agreement with one Norway's seed capital firms. The company has further received grants from Norwegian Research Council and Innovation Norway towards preclinical trials. Beta is in possession of three patents and has a proof of concept for its anticipated vaccines and due to long drug development times, it projects to make its first sales in 2016. The Top management team comprises of PhD graduates with research background in molecular biology and immunology. The top management team is supported by a board comprising of experienced executives in Pharmaceutical and drug development industry, business development and management, intellectual property rights, research and development and career entrepreneurs. They are further augmented with scientific board

comprising of highly distinguished scientific researchers in molecular biosciences, oncology and experimental cancer medicine, immunotherapeutic, vaccine research and antibody engineering.

From the illustrations above, I observe that critical to the resource holder's decision to invest financial resources in new enterprises may entail a new venture's social, human and technological capital. The geographical proximity to knowledge bases, University and location within science parks, of startups Beta and Gamma not only bestows an advantage as regards innovation or creative potential as a result of knowledge spillovers, but also endows them with a broader interpersonal and inter-organizational network. Industrial endorsement for firm's location within a cluster and conducive team atmosphere associated to the location are essential to startup's research exploration that is often core to the objectives of early stage technology based startups. The profiles of the mother companies of startups Alpha and Beta too not only points to breadth of knowledge resources available to them by founding companies but also the scope and size of the skilled labor pool from which they can tap into. The ownership of proprietary assets by Gamma and Beta is not only a precursor to their innovative speed, but also their research and technical capabilities. It's thus not surprising that Gamma and Beta are supplemented by distinguished management and scientific board members. The observations from the examples above point this research to the possibility of correlation between new venture's resource endowments and its eventual access to seed capital.

The impediment faced by new startups in search for scarce external resources vital for their survival and prosperity is not only immense but consequence of failure within cross section of some societies on the prospective entrepreneur is enormous. For the fact that some researchers have posited that firm resource accumulation and performance are path dependent, I find it relevant to entrepreneurial science that I investigate some of the fundamental resources critical to acquisition of seed capital by early stage venture firms.

2.0 A RESOURCE PERSPECTIVE TO NEW ENTREPRENEURIAL VENTURE

First and foremost, entrepreneurship as attributed to Schumpeter, is a new production function with Shane and Venkataraman (2000) defining entrepreneurship as the discovery and exploitation of profitable opportunities. Alvarez and Busenitz (2001) define entrepreneurship as a process of recognition and exploitation of opportunities that result in the creation of a firm that seeks to obtain entrepreneurial rents. Thereby introducing the concept of entrepreneurial recognition and resource organization to the resource theory of entrepreneurship. They further define entrepreneurial recognition as firm resource in which an entrepreneur discovers and/ or searches for opportunity(s). In concurrence, all these authors acknowledge that entrepreneurship is in its very nature, is a process involving the cognition, discovery, utilization of market opportunity and synchronization of relevant knowledge.

As such Barney (1991) uses the resource-based perspective on entrepreneurship to explicitly acknowledges that a firm's history is an critical precursor to the capabilities it eventually develops. In that way emphasizing the role of resources and capabilities in enhancing of firm's competitive advantage when accumulated by the organization at founding. Barney (1991) further argues that firms' resources are heterogeneously distributed across firms and a sustained competitive advantage is generated only through their value, rareness, inimitability and non- substitutability. He asserts that firm resources consist of assets, firm attributes, organizational processes, information and knowledge in its possession for the implementation its mission and objectives. He further classifies firm attributes into human capital resources, organizational capital resources and physical capital resources. Human capital consist of entrepreneurial experience, training (or education), intelligence, employees and managers, judgment and relationships. Organizational capital comprises of informal relations with environment, formal reporting structure, and coordinating systems. Where as physical capital include physical technology (patent, trademarks, trade secrets), plant and equipment and geographical location. Barney (1995) asserts that resources and capabilities for value creation are generally socially complex, tacit and path dependent suggesting that they require efficient coordination and integration.

Alvarez and Busenitz (2001) used the resource based view to inform and broaden entrepreneurial research suggesting that entrepreneurs use heuristics based logic to attach

value to resources thereby enhancing opportunity discovery, market understanding and coordination of knowledge resources. They argue that social complex is fundamental to entrepreneurship and exploitation of complex technologies. They further contend that entrepreneurial opportunities result due to varying significance attached to heterogeneous resources in the value addition chain and as such any attempt to exploit an entrepreneurial opportunity when it presents, an entrepreneurs' cognition will facilitate how best to bootstrap the necessary resources together as they start a new venture. This bootstrapping of resources in an economic fashion is a resource on its own that may arise out of ones social connections. But opportunities may present as obstacles or threats to one entity and as such many business organizations are driven to insulate themselves from the effects of such and yet others see an entrepreneurial opportunity that necessitates development of business concept. Earlier research accredited to Kirzner (1979) to be specific put forward the notion of 'entrepreneurial alertness' which he describes as the ability to see where products or services are lacking or have unexpectedly emerged as valuable – kind of superior insight to recognize value of a resource or an opportunity when it presents. Most importantly though, its in these circumstances of high ambiguity and uncertainty that early stage entrepreneurs use heuristic based logic to generate new insights and make sense out of uncertain and complex situations that inform strategic decision making to exploit brief windows of opportunity and navigate the problems inherent in the development of new firms (Busenitz and Barney 1997). Its noteworthy that ones heuristics are informed by personal experience and beliefs, the application of which within strategic business management is referred to as entrepreneurial cognition (Busenitz and Lau 1996; Wright, Hoskisson et al. 2000).

Entrepreneurial learning process critical entrepreneurial cognition development entails creating new and deeper understanding, interpretation and insights into subjects and events – knowledge. Thus, the use of heuristics in strategic management can shed light on learning process in the context of entrepreneurship (Alvarez and Busenitz 2001). This is in line with Barney (1991) assertion that the source of competitive advantage potentially evolves around knowledge creation and decision making capabilities which may result from the valuable and rare entrepreneurial insights and difficult to imitate decisions and ideas reached and as such a higher level learning is fundamental to solving ambiguous problems, perceiving new opportunities and unorthodox interpretations (Alvarez and Busenitz 2001). Noteworthy, is the assertion that an entrepreneur's use of heuristics may according to Busenitz and Barney (1997); (Gavetti and Levinthal 2000) explains the difference in innovative capabilities of

entrepreneurs and managers in larger organization as the latter in pursuit of innovative activities are often bogged down by policies and procedural routines that define established companies.

Noting that entrepreneurial opportunity is only a resource if person(s) with insight to probable value are able to mobilize assets to exploit them. Alvarez and Busenitz (2001) put forward the notion of entrepreneurial knowledge –“an ability to take conceptual, abstract information of where and how to obtain undervalued resources, explicit and tacit, and how to deploy and exploit these resources”. In brief, entrepreneurial knowledge is an intangible resource that involves identifying where and how to obtain organizational resources. Knowledge as suggested by (Grant and Baden-Fuller 1995); Grant (1996) embraces information, technology, know-how, and skills that can either be explicit or tacit. Tacit knowledge is embedded into the people and as such is dispersed, fragmented and difficult to communicate calling for coordination, transfer and integration. Alvarez and Busenitz (2001) argue that an entrepreneur(s) have generalized tacit knowledge on where to find and how to organize specialized knowledge and other essential resources key to new venture formation. To highlight the importance of integration of diverse specialized knowledge with in entrepreneurship, Schumpeter (1934) elucidates the concept of invention and innovation by distinguishing invention as the discovery of an opportunity where as innovation is the exploitation of a profitable opportunity.

As, indeed it is so, Alvarez and Busenitz (2001) posit that entrepreneurs’ involvement in society aids the gathering of diverse and very so often chaotic bits of information that may lead to accumulation of variety of resources key in new startup ventures and conception of new endeavors. In support of their proposition, they affirm that the differences in entrepreneurial cognition may explain the uniqueness in the development of social interactions with some researchers suggesting that entrepreneurs use “strength of weak ties”, a concept attributed to Granovatter (1973), to expose themselves to a broader cross section of people and substantial exposure to unusual and different ideas and resources.

2.1 Overview of Organizational Resources (Endowments)

New startup's assets portfolio of rare, valuable and non substitutable human capabilities (management and technical skills), technological capabilities (knowledge, organizational routines and processes) and social assets (information and resource network) have been classified as tangible and intangible assets with some researchers arguing that they are key construct for a firm's sustained competitive advantage (Barney 1991; Barney, Wright et al. 2001). Barney (1991) contend that a firm's position in an industrial setting and its current and future set of capabilities is inherently path dependent and thus, at founding, a firm's current portfolio of rare and valuable human, organizational and technological capital will affect future. Its this historical dependency perspective that is often used to explain firm's innovation capability, access to seed financing and even the evolution of serial entrepreneurs as knowledge accumulation inherent in entrepreneurial process influences future entrepreneurial endeavors (Fiol 2001; Lockett and Thompson 2001). In this paper, I attempt to empirically evaluate key entrepreneurial capital stock relevant to acquisition of seed finance.

Existing entrepreneurial research acknowledges the role of founder/ entrepreneur and structural characteristics of organization and environment in organizational success and tend to depict the former by their personal characteristics. Many researchers contend that both human capital and organizational characteristics are critical for resource accumulation. Individual characteristics of the founder particularly the level of education, age, work and industrial specific experience have positive correlation on the resource development with organizational characteristics especially business strategies, number of employees, capital invested, etc. having an effect on firm performance.

However, the process of mobilizing resources to build a new organization is an inherently social endeavor laden with uncertainty and unpredictable risks in attempt to acquire financial, technological and social resources through relationship with external resource holders (Baum and Silverman 2004). Baum and Silverman (2004) argue that due to the great uncertainty about the quality of startups, resource holders' decision on financing of startup will rely heavily of startup assets – technological capital, social capital and human capital and thus startups capable of bridging social networks, high innovation potential and outstanding entrepreneurial and research team will better the rest short of the above characteristics.

It's the objective of this paper to analyze the effect of startups' organization capital, technological capital and human capital characteristics on the financial intermediary's decision to finance them. In entrepreneurial financing and business development, financial intermediaries like business angels and venture capital firms are viewed (or assumed) in the positive light of 'informed agents' adept to identifying the next exceptionally prospective technological startups and as a result, access to seed capital is an endorsement enabling the startup acquisition of other external resources (e.g. social capital) (Stuart et al.,1999). Stuart, Hoang et al. (1999) argues that access to different forms of capital is seen more as an important signal to resource holders of a startup's future promise. It's argued that resource endowment levels directly hamper organizational decision making and consequently the level of initial resource endowments may position new ventures on different growth trajectories. This may imply that early organizational decisions carry on for significant periods of time thereby affirming that early resource endowments set a new venture on the path towards long term sustained advantage, otherwise, the lack of which might lead to inferior structures, internal processes and human resource (Shane and Stuart 2002).

2.2 Social Capital

Where as creating new organizations involves the optimal allocation of scarce resources to novel uses, often the entrepreneurs who discover opportunities for new ventures lack or do not control the resources necessary to undertake the endeavor and thus are obliged to solicit the sponsorship of external investors (Shane and Stuart 2002). As such entrepreneurial access to scarce resources-financial capital, social capital or otherwise becomes an inherently social process as interaction and business relations are with resource holders external to organizational boundaries. Because of the externality of resource holders, decision to invest time, capital, and like is made under great uncertainty about the nascent enterprises financial and market prospects. For that reason, new venture formation process is impeded by prevalent information problems that make it likely that founders' social capital influences firm performance, more especially with technology based ventures and as such the social capital of founding entrepreneurs is a vital endowment for early-stage entrepreneurial venture success and their survival. The founders of early-stage ventures differ in both interpersonal and technical skills key to acquisition of the support of resource holders, and this difference probably has a significant effect on firm's acquisition of seed capital.

Researchers within entrepreneurial science have noted that information asymmetries between resource holders and entrepreneurs encumber the evaluation of new ventures as the decision to invest time and fundamental resources into an new venture depends on ones appraisal of the attractiveness of the opportunity and entrepreneurial team. For this reason and other sets of uncertainties associated with the quality of early stage firms elevate the significance of organizational capital of firm as a basis for making investment decision (Shane and Stuart 2002). The uncertainty of the quality of startup is in part due to lack of historical firm performance records, novel technology with under developed or undefined market segment and yet it's this information used in assessment of viability of new enterprise. Its this information asymmetries between the two prospective partners that frequently obscures evaluations of new ventures and this problem may be predominantly acute in early stage technology based ventures founded by the leading experts in the relevant area of technology who are privy to more information about the prospects of their technology and venture (Shane 2001; Shane and Stuart 2002). Under the circumstances, some researchers have argued that the resource holder will often rely on ones social network to select transaction partners and for this reason social and inter-organizational networks serve to select reliable partners and enforcement of implicit contracts (Shane and Stuart 2002). This is highlighted by the fact that conduct and behavior of entrepreneurs in previous transactions disseminates through social network and as a result entrepreneurs and organization within a network have an incentive to behave with good faith to preserve the trust and the relations for future transactions.

Prior research has broadened the knowledge and understanding on inter-organizational networks in entrepreneurial environment with Stuart, Hoang et al. (1999) expounding on how inter-organizational relationship by early stage ventures affect their survival and growth. Because previous achievements of a new entrepreneurial venture are scanty to resolve the uncertainty surrounding new ventures in general, resource investors look to the firm's social structure to influence perceptions on quality and reliability. And as result, the characteristics of new venture's exchange partners could likely sway better judgment since relationships have reciprocal effects on reputation of those involved. Podolny and Phillips (1996) argue that in the event of considerable uncertainty as regards the new venture, resource holders will judge its quality based on the identity of its exchange partners. Similarly, Stuart, Hoang et al. (1999) argues that new venture partnership with prominent organization will draw attention to it as prominent organizations are nucleus for industrial analysis and business press. For that

reason, they argue that, established organizations avoid relations with unreliable partners, and the fact that a new venture in affiliation with one is a signal of reliability and trustworthiness. This is because exchange partnerships may lead to possibility of loss of social standing and threat of dissolving the economic and social rents advanced by a good reputation, therefore prominent organizations are exclusive in their selection of partners (Podolny and Phillips 1996). In a similar light, Podolny and Stuart (1995), demonstrated that inventions within uncertain technological fields were more likely taken on if adopted beforehand by high status organizations. This is line with long held assertion that one's reputé is built in part on the character of his/ her acquaintances, and as such, cooperation may implicitly transfer status between partners (Stuart, Hoang et al. 1999). Putting it differently, reputation of prominent exchange partners has multiplicative effect on resource access and resultant competitive advantage for new venture (Burt 1997).

2.2.1 Hypothesis development

Inter-organizational cooperation is associated with access to firm's complementary resources and tend to present an impression of legitimacy (Baum and Oliver 1992; Chung, Singh et al. 2000) especially in pursuit of financial and knowledge resources (Teece 1992). Inter-firm cooperation at infancy may confer early stage technology firms myriad of opportunities key to survival and thrive and may be eventual creation of its competitive advantage. Inter-firm alliances not only provide signals better firm performance, access to valuable resources, higher market evaluations, and knowledge critical to early performance and indicate external endorsements but also help alleviate the liability of newness and smallness evident in majority of startups (Stuart, Hoang et al. 1999; Baum, Calabrese et al. 2000). In this section, *I posit that a new venture's social capital will enhance its likelihood to obtain seed capital.* However, social capital is a very broad concept that can only be tested through operationalization of the fundamentals of social capital for example inter-organizational cooperation (affiliation, partnership), team atmosphere for which a test.

The assumption I attempt to investigate in this paper is whether new venture cooperation with direct competitors contributes to new venture performance as many entrepreneurial scholars have posited that inter-organizational capital has an effect on new ventures' ability to secure external financing necessary to pursue the opportunities they discover. Due to the extent of

the financial obligations to explore and bring a ‘ new technology’ to market, often new entrepreneurial ventures especially research based reach out to established partners and research institution for collaboration. This so often places new startups at the disadvantage as regards to the ownership of proprietary assets but in positive light, an alliance facilitates fast technology and product development. This is exacerbated by the very fast obsolescence of technologies and as such a new venture may have to meditate on the pros and cons as regards to partnership with a competitor. But decisively to this relationship is the new venture’s pool of resources and capabilities for the reason that, the prospective established cooperating competitor too does carry out a due diligence of the new firm characteristics and benefits of entering a partnership with a startup. Critical to the fruitful relationship is the new venture’s entrepreneurial team’s absorptive capacity for which, I, assume is reflected in the team educational backgrounds. It’s on that rationale that, I posit

Proposition 1a: *A highly educated entrepreneurial team in cooperation with competitor is more likely to obtain seed capital.*

An entrepreneur’s social capital is product of one’s prior endeavors within a particular industrial or social grouping. Social capital embodies entrepreneurial knowledge- information of where and how to obtain key firm resources and it’s nurtured over ones career. However, it varies based on the role within a grouping or cluster which may explain the differences in the entrepreneurial capabilities. Implicitly, the more status roles one holds within a bounded environment, the deeper is the entrepreneurial knowledge and consequently, the social capital. I, assert that a prospective entrepreneur with profound entrepreneurial knowledge or in simple terms leadership experience will have a broad access to resources key to new venture formation. Because the success of new technology based startups is often premised on the motivation, technical skills and team atmosphere and as such experienced executives will make effort to create a conducive working environment. In there I, assume that ones prior leadership experience will inform judgment as regards to the ingredients of conducive team atmosphere and as such I, attempt to investigate the effect of leadership experience, number of PhD graduates in the entrepreneurial team and team atmosphere on the probability of obtaining seed capital. Therefore, I posit

Proposition 1 b: *An entrepreneurial team with more PhD graduates working in a passionate environment under an entrepreneur with vast top leadership experience will more likely obtain seed capital.*

Proposition 1c: *An entrepreneur with vast top management leadership experience will create a passionate working atmosphere which will enhance the likelihood of obtaining seed capital.*

2.3 Human Capital

Resource holders often emphasize the importance of the entrepreneurial team and as such accentuate human capital as central to firm success. Fundamental to firm's human capital are human resource management systems and routines evolving overtime to create specific human capital skills, employee behavior and motivation, and attraction and retention of staff unique to a particular firm (Barney, Wright et al. 2001). It's these skills that differentiate among new venture competing for seed financing from financial institution.

Prior research within human capital subject asserts that it's generally intangible and cumulative, and as such, people through formal education and on job training are able to interpret more specific semantics and as a result acquire productive knowledge and information. With Nerdrum and Erikson (2001) affirming that intellectual capital is indeed a resultant of formal education and/ or on job training.

Alvarez and Busenitz (2001) posit that entrepreneurs possess individual –specific resources that facilitate opportunity recognition and pulling together resources critical to venture formation. Given that ones individual characteristics and decision styles are tacit and thus can't be readily transferred it becomes apparent that they are a resource within the entrepreneurial domain. According to Alvarez and Busenitz (2001), due to scarce information, entrepreneurs tend to use heuristic based logic that allows assembly and development of resources in new nontraditional ways allowing them to thrive with new inventions and opportunities that evolve in nonlinear manner. An entrepreneur's ability to continuously innovate by recombining new resources is primarily a resource for the entrepreneurial firm that will attract resource holders – financial, human and organizational capabilities leading to firm survival and eventual success- wealth creation (Alvarez and Barney 2001). The

entrepreneurial knowledge of resource reorganization that is critical to acquisition of scarce resources necessary for new venture formation.

Some researchers have posited that top management team characteristics can forecast the organizational outcomes as the former reflect the values and cognitive bases of individuals involved. Gavetti and Levinthal (2000) argue that cognition is a manifestation of ones mental strength viewed as a forward looking form of intelligence premised in the actor's beliefs in existing choices of actions. Cognition at its best embodies ones inference, perception, value judgments, sense making, emotions and intuition (Cohen and Levinthal 1990). However, Knockaert, Ucbasaran et al. (2011) point out the limitation of inventors as very highly specialized within a particular science and technical field, but, most often limited on market information and so, the effect of cognitive distance as a result of the overlap in knowledge, experience, skills, frames of reference across the team on acquisition of external scarce resources- venture and seed finance is relevant and unexplored. Yet it's often highlighted that some financial investors are people investors and as such finding the consequence of diversity of entrepreneurial team on investment decision is of key relevance.

In line with above, some authors have found association between complementarity and quality of human capital, arguing that former could increase with degree of specialization of the latter. Nerdrum and Erikson (2001) assume that the more formal education and complementarities of knowledge capital possessed by an individual(s), the more valuable are the additions to intellectual capital will be. However, prior research points to homogeneity among top management teams of new venture firms with Franklin, Wright et al. (2001) arguing that entrepreneurial founders tend to select team members from within their social networks often lacking commercial experience and orientation- a phenomenon some refer to as human resource gap (Lockett, Siegel et al. 2005). Di Gregorio and Shane (2003) argue that technology needs to be modified to needs of the end user as technology and specificity of accompanying knowledge are often rare and embodied in the founders/ inventors and as such its not market ready. This indeed goes to emphasize the need for diversity within the entrepreneurial team.

2.3.1 Hypothesis development

Positively, considerable literature on entrepreneurship has highlighted the correlation between venture performance and entrepreneurial team e.g. (Colombo and Grilli 2005; Clarysse, Wright et al. 2007) with some theorizing that entrepreneurial teams with diverse training, functional and work backgrounds are likely to have deeper knowledge bases and cognition that ultimately influence strategic decision making. However, due to the lack of a standard entrepreneurial team configuration, some have challenged the proponents of heterogeneity of top management team arguing that it more often leads to a less common ground propagating conflict thereby interfering with knowledge sharing and combination critical to commercialization of technology (Cowan and Foray 1997).

Given Barney (1991) assertion that firm's resources are path dependent, that is to say, past entrepreneurial decisions made by founders and managers are embedded in ones (individual's or firm's) DNA composition (Alvarez and Busenitz 2001) and as such ones prior experience in top management leadership or industrial experience will inform his/ her cognition, decision making and generalized knowledge base. I, argue that an experienced entrepreneur will have stronger appreciation and better judgment of the importance of functional diversity team on the overall cognitive knowledge base of the entrepreneurial venture and the essential process for the effective team performance. In light of the above, I, thus, theorize that that besides the tacit knowledge about technology embodied in the entrepreneurial founding team is the commercial mindset of the top management team that is vital in interpretation of external market information, ensuring effective and appropriate product development and consequential resource accumulation. Therefore, I posit;

Proposition 2a: *A functionally diverse entrepreneurial team will have a higher likelihood of obtaining seed capital.*

Proposition 2b: *An entrepreneur with considerable experience having a bias towards educational and functional diversity running an entrepreneurial team of diverse functional roles should have a higher probability of obtaining seed capital.*

Human capital is often classified into general and specific human capital. With general human capital entailing work experience, general education and occupational training. One key

indicator of entrepreneur specific human capital is leadership experience, that is experience managing and directing employees (Brüderl, Preisendörfer et al. 1992). Leadership and industrial experience does not only carry with it social capital but also can inform judgment in event of uncertainty and enhance the accumulation of scarce organizational resources.

Prior research theorized that firm's resources portfolio is path dependent, thus prior employer of startups' founding management team reputation pre-cedes access to external resources – financial and organizational capital especially under conditions of uncertainty in innovative startups (Baum and Silverman 2004). Zacharakis and Meyer (2000) show that financial resource holder rate top management experience and skills highly in the course of due diligence often accentuated by “we invest in the team”. With seed and venture capital investors claim to invest in people with drive to succeed, high motivation and strong commitment.

Zucker, Darby et al. (1998) affirms that the identity and background of top management is vital antecedent to startup potential thereby collaborating the postulation that human capital is key to obtaining seed financing. In support of this, Shepherd and Zacharakis (1999) research in entrepreneurial finance, does highlight prominence attached to managerial and entrepreneurial experience of the entrepreneurial team members in relation to its technical expertise. Therefore, I, posit

Proposition 2 c: *An entrepreneurial venture in possession of patent having TMT with higher education will more likely obtain seed capital*

Proposition 2d: *An entrepreneurial venture in possession of a patent having more full time master graduate employees will have an elevated probability of obtaining seed capital.*

Proposition 2e: *An entrepreneurial team of TMT members having vast industrial experience will more likely acquire seed capital.*

2.4 Technological Capital

It is common that high tech ventures are built around the founding team who possess technical expertise behind the technology and holding the knowledge based theory assumption that organizational knowledge accumulates through the process of creativity and exploitation, the founding entrepreneurs' expanding knowledge and absorptive capacity will manifest in the entrepreneurial firms growing technological knowledge base (Alvarez and Busenitz 2001). Cohen and Levinthal (1990) define absorptive capacity as one's ability to recognize external information and assimilate it for commercial reward. Thus the entrepreneurial firm's absorptive capacity which I assume here, to be a derivative of founding team absorptive capacity will determine the entrepreneurial firm's success in obtaining technological capital and ensuing entrepreneurial rents.

As, indeed it is so, the firm's success as noted hinges on firm's knowledge base, and ability to integrate and deploy this resource for commercial rent. This knowledge resource is often categorized into tacit and explicit, with the latter taking the form of coded language like publication, patents, contracts etc where as tacit knowledge is rooted into social and cultural fabric of the people involved (Cohen and Levinthal 1990; Knockaert, Ucbasaran et al. 2011). Unlike, explicit knowledge that can easily be transferred at arms length negotiation, the exchange of tacit knowledge is rather difficult, requiring the establishment a mutual trust through close interpersonal liaison among the actors that enable development of new codes and semantics overtime – kind of mentor and mentoree relationship. In fact, prior research posits that experienced superiors in the course of mentoring their subordinates within the firm directly and unknowingly transfer tacit knowledge accumulated over the years.

In a similar light, Clarysse, Wright et al. (2007) stress that the quality of the entrepreneurial venture will determine how effectively it accesses scarce resources and as such hold that their innovation and intellectual property strategy is fundamental in acquisition of financial resources. Intellectual property strategy will describe approaches a firm undertakes to manage and enhance its intellectual capital portfolio for economic benefit. Nerdrum and Erikson (2001) define intellectual capital as one's complementary capacity of competence and commitment that result into generation of added value and wealth for a company. This indeed is in support of Ulrich (1998) assertion that intellectual capital is a firm resource with a multiplicative function of competence and commitment. Putting it differently, a firm in possession of an

intellectual capital, patent or even pending, trademark and trade secret or otherwise that allows it to attain a competitive or economic advantage over its rivals is an indication of its competence and commitment. According to Barney (1991), resources such as intellectual property with specific attributes of valuable, inimitable and even rare as is the case with trade secret present firm with a critical source of competitive advantage.

Some entrepreneurship scholars have argued that firm's ability to apply dynamic capabilities fast and shrewdly in market setting is a capability on its own (Barney 1991; Fiol 2001; Eisenhardt and Martin 2003). This capability does not only indicate one firm's alertness and agility to market forces and dynamics but may also reflect new venture's creativity, innovation speed and product to market time. Further still, prior research assumes that managerial capabilities grow as result of ones experience and tend to be firm specific. This means that firm's absorptive capacity ensuing out managerial capabilities differ that is to say that the more entrepreneurs and their firms have absorbed in terms of entrepreneurial absorptive capacity for example technical experience, opportunity recognition and the continuous innovation learning over their previous endeavors the greater the casual ambiguity (Lane, Salk et al. 2001). Causal ambiguity is the uncertainty causing variations in firm performance and may accordingly explain inimitability of firm resources and capabilities (Alvarez and Busenitz 2001). These firm capabilities could be embedded into new product development systems, human resource management systems, organizational relationship that even the firm or its employees might not be able to describe, observe or even value as they are strongly tacit and socially complex and over time gets rooted into their organizational culture. Moreover, the development of complex technologies involves the use of socially complex resources and such entrepreneurial firm in possession of so will need entrepreneurial knowledge to realize full potential of the technology (Alvarez and Busenitz 2001). Explicitly, research in innovation management affirms that critical to the development of new technology breakthroughs and eventual rents is the access to expertise knowledge and talent categorized as human capital- a resource that is tacit and non imitable (Zucker, Darby et al. 1998; Powers and McDougall 2005).

2.4.1 Hypothesis development

Essential to new research based entrepreneurial development is the availability of technical expertise with suitable know-how in R&D and appropriate knowledge. Where as the process

of successful introduction of new products to market is the lifeblood of most organizations, the precursor to a new product for the better part is the R&D undertaken to produce it (Balachandra and Friar 1997; Balachandra and Friar 1999). The entire course of product- to-market and product competitiveness in the market is caught up in the uncertainty about technology, market, cost of production associated with the development and commercialization process. Like, earlier research posited that teams with vast experience in R&D and market have higher understanding of customer needs and technical requirements for product development which may be demonstrated through shorter product to market times, I envisage that a highly educated founding team will resonate into startup research potential and consequently its future innovative and creative prospects.

Within high tech industry, firm's innovativity is foundation for competitive advantage, and as such its patents are precursor to future scientific developments and consequential commercial success (Cohen and Levinthal 1990; Kogut and Zander 1996). As a result resource holders often rely on new ventures prior exploits to signal its abilities as they seek to make quality judgments, for which patent portfolio accrued, in case of new technology based firms is most used measurable parameter. Firm's patents are not only property rights to probable income generating invention but also signal the depth of firm's core scientific and engineering resource (Stuart, Hoang et al. 1999). As such the appropriability regime accompanying some patents (especially biotech) eases the acquisition of key complementary assets and skills for entrepreneurial formation and consequently access to seed financing (Lerner 1994). Prior research shows that a firms' patent portfolio not only increases market valuation (Stuart, Hoang et al. 1999), improves the likelihood of acquisition of seed and venture financing, enhances startup chances of survival (Silverman and Baum 2002) but also is a precursor to entrepreneurial creativity. As such, I, posit

Proposition 3a: *An entrepreneurial team with more full time employees will have a great chance of making a technology break through thereby enhancing its chances of obtaining seed capital*

Proposition 3b: *An entrepreneurial team with more master graduates on full time will more likely make a technology breakthrough thereby enhancing its chances of obtaining seed capital.*

3.0 METHODOLOGY

The firms in the survey are characterized by high levels of innovation within a rapidly changing market undertaking the exploitation of radically new and often disruptive technologies at early stages of development and as such, are challenged in regards to sourcing seed finance and narrow human and knowledge resource base.

3.1 Data Collection

The data used for this paper was the work of student research group at the Center of Entrepreneurship. They defined the data sample to include Technology based startups within the industrial sectors of Oil and gas, Renewable Energy, Information technology, Mining and Biotechnology in Norway. The sample list is an extract from Norwegian Research Council archives and Campus Kjeller that totaled to 147 startups. The research team used questionnaires with results collected via Check Market. Of the original 147 emails sent, only 66 emails were received representing a reception rate of 44.9%. Of the 66 that received the emails and link to survey, 56 responded giving a response rate of 38% as compared to the emails sent and a response rate of 84.8% as compared to email response. Of those that responded, 9 of the questionnaires were incomplete.

Using the set control variables of firm age, industry and firm size, another 7 ventures were omitted leaving a sample of 40 ventures for analysis representing a 27% response rate as compared to emails sent and 60% response comparing to email response. This response rate is fair enough to measure effect of the predefined independent variables against the dependent variable (Seed capital).

3.2 Data Variables

3.2.1 Dependent variable

In this paper, dependent variable is defined as seed capital. Seed capital is early stage financial investment into a new venture firm. Due to high risks associated with new startups,

seed capital is relatively small and often used research and development, business concept development and so forth.

3.2.2 Independent variables

This research adopts management team characteristics as independent variables. For that reason variable effect analysis is made for top leadership experience, size of TMT, education of TMT, cumulative industrial experience of management team, functional diversity of the management team, ranking of relevancy of functional diversity, number of full time employees, number of patents.

3.2.3 Control Variables

Many researchers within entrepreneurial science and new venture formation, have adopted key firm variables like firm size (number of employees), firm age as control variables. Consistent with tradition, yours truly has adopted firm age i.e. ventures founded after 2000- this is because the role of seed capital was most popularized in Europe after the 2000 Dot Com bubble, firm size, restricting it to a maximum of 50 employees and industry, with companies that have not specified the industrial focus omitted.

3.4 Data Analysis

This paper uses a logistic regression model to analyze the data collected. The choice of model is founded on the fact seed capital is a binary outcome (i.e. the startup either received seed capital, 1 as in coding of data or did not receive, 2) with varying predictor variables that are either nominal or scaled.

$$p(x) = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n)}{1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n)}$$

For n independent predictor, x.

The odd ratios corresponding to one unit increase in value of covariate can then be computed using,

$$\text{Odd ratio} = \exp(\beta_1)$$

Where, β_1 is the estimate for predictor x1 in the result table. The same equation applies for the other variables within each of the models.

Odd ratio will give us the probability effect of each of the independent variables with respect to dependent variable Seed capital. For example, model of the effect of an entrepreneurial team working in an enthusiastic team atmosphere on the likelihood of getting seed capital returns the table below;

```
Call:
glm(formula = Seed_Capital ~ TeamAtmosphere_Ethusiastic, family = binomial,
    data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.5829  -1.0769  -0.5168   1.2814   2.0393

Coefficients:
                                Estimate Std. Error z value Pr(>|z|)
(Intercept)                   0.9163     0.8367    1.095   0.273
TeamAtmosphere_EthusiasticQuite Often   -1.1575     0.9286   -1.246   0.213
TeamAtmosphere_EthusiasticExtremely Often or Always -2.8622     1.3575   -2.108   0.035 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 54.548  on 39  degrees of freedom
Residual deviance: 48.701  on 37  degrees of freedom
AIC: 54.701

Number of Fisher Scoring iterations: 4
```

Figure 1: Example of results table

The effect of enthusiastic team atmosphere will be significant at the level of 95% with a probability generated from the odd ratio $1 - \exp(-2.8622 - -1.1575)$. Indicating that effect is more significant within Extremely Often or Always working environment than under Quite Often working environment by the value of the equation above as a percentage.

4.0 RESULTS

The computation of the data is carried using R -a statistical software package. However, the coding of the data was done in SPSS. Important to note that the coding of Seed Capital in SPSS was such that ventures that obtained seed capital are assigned a value of 1 where as those that did not receive are assigned a value of 2. What this means that when computations are done in software, R, it compares those that did not receive seed capital to those that received. The consequence of this is the negative returns in estimate. But this only means that, the chances one venture firm not receiving seed capital given a particular variable, X, decreases with increase in variable, X. Putting it differently, the chances of a one startup receiving seed capital increases with increase in variable, X.

Proposition 1a: Effect of Cooperation with competitor, and TMT education on seed capital

Proposition 1a attempts to test the effect of a highly educated entrepreneurial team in cooperation with competitor on the new venture's likelihood of obtaining seed capital. This hypothesis is premised on the assertion that inter-organization cooperation is associated with access to firm's complementary resources and tend to present an impression of legitimacy.

The model tests for the moderating effect of education of entrepreneurial team on the cooperation with competitors in eventual access to seed capital. Analysis of which returns the table below;

```
Call:
glm(formula = Seed_Capital ~ Cooperation_Competitor + TMTEducation_Master +
    TMTEducation_PhD + TMTEducation_Master:Cooperation_Competitor +
    TMTEducation_PhD:Cooperation_Competitor, family = binomial,
    data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.4998  -0.8984  -0.5868   0.8965   1.9134

Coefficients:
                                Estimate Std. Error z value Pr(>|z|)
(Intercept)                   -2.7033     2.0795  -1.300    0.1936
Cooperation_CompetitorNo        4.6214     2.6143   1.768    0.0771 .
TMTEducation_Master            -0.2517     0.5103  -0.493    0.6219
TMTEducation_PhD               2.1827     1.7664   1.236    0.2166
Cooperation_CompetitorNo:TMTEducation_Master -0.9343     0.8318  -1.123    0.2614
Cooperation_CompetitorNo:TMTEducation_PhD   -2.1988     1.8459  -1.191    0.2336
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 42.340  on 31  degrees of freedom
Residual deviance: 36.064  on 26  degrees of freedom
(8 observations deleted due to missingness)
AIC: 48.064

Number of Fisher Scoring iterations: 4
```

Figure 2: Results table (Prop 1a)

Results show that a highly educated entrepreneurial team without cooperation with competitor is 100 times least likely to obtain seed capital as compared to one having cooperation. Implying that at 90% significance, a highly educated team in cooperation with competitor will get seed capital unlike one without cooperation. Thereby verifying the proposition only at a significance level of 90%.

Proposition 1b: Effect of team atmosphere, Leadership experience and TMT education on seed capital

Proposition 1b empirically analyses the effect of an entrepreneurial team with more PhD graduates working in a passionate environment under an entrepreneur with vast top leadership experience on new venture's likelihood of obtaining seed capital. This postulation is on the basis that tacit knowledge is embedded into the people and as such is dispersed, fragmented and difficult to communicate calling for coordination, transfer and integration for which executive with deeper entrepreneurial knowledge are able to identify and provide an environment critical for the motivation of the research staff. The model moderates the effect of enthusiastic team atmosphere on the PhD research graduates within team. The analysis of which returns the table below;

```
Call:
glm(formula = Seed_Capital ~ TMTEducation_PhD + Top_Leadership_Experience^2 +
    TMTEducation_PhD:TeamAtmosphere_Ethusiastic, family = binomial,
    data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.0363  -0.8244  -0.3705   0.9365   1.8178

Coefficients:
                                Estimate Std. Error z value Pr(>|z|)
(Intercept)                   0.68105     1.18301   0.576   0.5648
TMTEducation_PhD               1.39337     1.24433   1.120   0.2628
Top_Leadership_Experience      -0.13550     0.07659  -1.769   0.0769 .
TMTEducation_PhD:TeamAtmosphere_EthusiasticQuite Often    -1.35211     1.04715  -1.291   0.1966
TMTEducation_PhD:TeamAtmosphere_EthusiasticExtremely Often -2.83636     1.36398  -2.079   0.0376 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 45.234  on 33  degrees of freedom
Residual deviance: 35.731  on 29  degrees of freedom
(6 observations deleted due to missingness)
AIC: 45.731

Number of Fisher Scoring iterations: 5
```

Figure 3: Results table (Prop 1b)

The model at a significance level of 90%, returns 13 % increase in probability of obtaining seed capital if the entrepreneur has vast top leadership experience. I also observe at 95% significance level, a strong confounding effect of team atmosphere on TMT with PhD graduates if it's enthusiastic. The results show that a team of PhD graduates working in an extremely often enthusiastic environment are 78% more likely to obtain seed capital than one working in Quite often enthusiastic environment.

Proposition 1c: Effect of leadership, team atmosphere on seed capital

Under proposition 1c, empirical analysis of the effect of how an entrepreneur with vast top management leadership experience able to create a passionate working atmosphere which will enhance the likelihood of a new venture obtaining seed capital. The model moderates the executive's top leadership experience on the team atmosphere for which analysis returns the table below;

```
> fit=glm(Seed_Capital~Top_Leadership_Experience^2+Top_Leadership_Experience:TeamAtmosphere_Ethusiastic, data=seedcapdata, family=binomial)
> summary(fit)

Call:
glm(formula = Seed_Capital ~ Top_Leadership_Experience^2 + Top_Leadership_Experience:TeamAtmosphere_Ethusiastic,
    family = binomial, data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.7930  -0.9557  -0.4965   1.0149   1.9220

Coefficients:
                                Estimate Std. Error z value Pr(>|z|)
(Intercept)                   0.5447     0.6789   0.802   0.4224
Top_Leadership_Experience      0.1049     0.1384   0.758   0.4486
Top_Leadership_Experience:TeamAtmosphere_EthusiasticQuite Often  -0.1789     0.1265  -1.414   0.1572
Top_Leadership_Experience:TeamAtmosphere_EthusiasticExtremely Often or Always -0.5407     0.2524  -2.142   0.0322 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 54.548  on 39  degrees of freedom
Residual deviance: 44.639  on 36  degrees of freedom
AIC: 52.639

Number of Fisher Scoring iterations: 5
```

Figure 4: Results table (Prop 1c)

I find that leadership has a strong confounding effect on team working environment at significance level of 95%, with an increase of 30% likelihood of obtaining seed capital if an entrepreneur with vast leadership experience provides an often extremely enthusiastic atmosphere than is the case with quite often enthusiastic working environment .

Proposition 2a: Effect of team functional diversity on seed capital

Proposition 2a tests for the effect of a functionally diverse entrepreneurial team on the new venture's likelihood of obtaining seed capital. This hypothesis is premised on the background that an entrepreneurial team with diverse training, both functional and work backgrounds are likely to have deeper knowledge bases and cognition that ultimately influence strategic decision making. As such, analysis returns the table below;

```

Call:
glm(formula = Seed_Capital ~ Functionalrole_Engineering + Functionalrole_Finance +
  Functionalrole_Human_Resource + Functionalrole_Marketing +
  Functionalrole_Operations + Functionalrole_ResearchDevelopment,
  family = binomial, data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.32179  -0.69280  -0.04937   0.85839   1.21237

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)   -0.04345    1.39671  -0.031   0.975
Functionalrole_Engineering -0.90971    0.84998  -1.070   0.284
Functionalrole_Finance    -1.83625    2.44862  -0.750   0.453
Functionalrole_Human_Resource  1.80341    1.72841   1.043   0.297
Functionalrole_Marketing    2.70734    1.60717   1.685   0.092 .
Functionalrole_Operations   -2.38511    1.57223  -1.517   0.129
Functionalrole_ResearchDevelopment  0.58190    1.14940   0.506   0.613
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 30.498  on 21  degrees of freedom
Residual deviance: 20.608  on 15  degrees of freedom
(18 observations deleted due to missingness)
AIC: 34.608

Number of Fisher Scoring iterations: 6

```

Figure 5: Results table (Prop 2a)

On the contrary, I observe that at 90% significance level, an entrepreneurial team with more employees with marketing functions is 14 times less likely to get seed capital.

Proposition 2b: Effect of leadership, team functional diversity and rating of relevancy of functional diversity on seed capital

In proposition 2b, I evaluate the effect of an entrepreneur with considerable experience having a bias towards educational and functional diversity running an entrepreneurial team of diverse functional roles on the new entrepreneurial venture's probability of obtaining seed capital. Like before, this hypothesis is premised on the entrepreneurial teams with diverse training having deeper knowledge bases and cognition as well as an executive's prior experience in top management leadership or industrial experience informing his/ her cognition, decision making and generalized knowledge base of the importance of functional diversity team. The analysis of which results into;

```

Call:
glm(formula = Seed_Capital ~ Functionalrole_Engineering + Functionalrole_Finance +
  Functionalrole_Human_Resource + Functionalrole_Marketing +
  Functionalrole_Operations + Functionalrole_ResearchDevelopment +
  Top_Leadership_Experience^2 + Diversity_type_Educational +
  Diversity_type_Functional, family = binomial, data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.00500  -0.46966  -0.01385   0.59926   1.98942

Coefficients:
                Estimate Std. Error z value Pr(>|z|)
(Intercept)         6.8094     8.1737   0.833  0.4048
Functionalrole_Engineering -1.7397     1.4085  -1.235  0.2168
Functionalrole_Finance -1.8794     2.9779  -0.631  0.5280
Functionalrole_Human_Resource  2.8059     2.3877   1.175  0.2399
Functionalrole_Marketing  3.6963     1.6116   2.294  0.0218 *
Functionalrole_Operations -2.2959     1.4941  -1.537  0.1244
Functionalrole_ResearchDevelopment -2.1912     1.8228  -1.202  0.2293
Top_Leadership_Experience -0.3587     0.2945  -1.218  0.2233
Diversity_type_Educational -1.8840     1.7751  -1.061  0.2885
Diversity_type_Functional  2.1125     1.6133   1.309  0.1904
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 27.526  on 19  degrees of freedom
Residual deviance: 12.367  on 10  degrees of freedom
(20 observations deleted due to missingness)
AIC: 32.367

Number of Fisher Scoring iterations: 7

```

Figure 6: Results table (Prop 2b)

Proposition 2b assertion that indeed a functionally diverse entrepreneurial team under an entrepreneur with vast top management experience and bias towards functional an educational diversity will more likely obtain seed capital is contradicted as I observe that at significance level of 95%, an entrepreneurial team with more market oriented diversity is 39 times least likely to ever getting seed capital.

Proposition 2c: Effect of Patent, TMT education on seed capital

Proposition 2c investigates the effect of an entrepreneurial venture in possession of patent having TMT with higher education on its chances of obtaining seed capital. This hypothesis is held on the argument that financial resource holder rate skills highly in the course of due diligence often accentuated by “we invest in the team” buzzword and the fact that resource investors are seeking to exploit the existing patent to its full commercial potential. Analysis of which returns the table below;

```

Call:
glm(formula = Seed_Capital ~ Patent + TMTEducation_Master + TMTEducation_PhD +
    Patent:TMTEducation_Master, family = binomial, data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.6348  -0.7916  -0.3340   0.7716   1.6526

Coefficients:
                Estimate Std. Error z value Pr(>|z|)
(Intercept)         3.16141    1.86538   1.695  0.0901 .
Patent              -0.49964    0.34001  -1.470  0.1417
TMTEducation_Master -2.13008    0.86584  -2.460  0.0139 *
TMTEducation_PhD     0.02791    0.56212   0.050  0.9604
Patent:TMTEducation_Master 0.31862    0.14808   2.152  0.0314 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 42.340  on 31  degrees of freedom
Residual deviance: 31.595  on 27  degrees of freedom
(8 observations deleted due to missingness)
AIC: 41.595

Number of Fisher Scoring iterations: 5

```

Figure 7: Results table (Prop 2a)

I observe that an entrepreneurial venture in possession of patent having more TMT master graduates than PhD graduates will have at 95% significance level, an 12% increase of obtain seed capital. There is a confounding effect of patents on TMT with master degrees which may indicate a limit to the proposition that is, a patent may require a certain level of technical skills below which a venture's chance of obtaining seed capital reduces.

Proposition 2d: Effect of patent, TMT education and employee number on seed capital

Proposition 2d investigates the effect of an entrepreneurial venture in possession of a patent having more full time master graduate employees on its probability of obtaining seed capital. Some researchers affirm that the identity and background of top management is vital antecedent to startup potential and as such the commitment and motivation to endeavor of the founding team. Given that the new venture is already in possession of patent, I assume that resource holders will assess the commitment of the entrepreneurial team. The model tests the confounding effect of the number of full time employees with TMT master education. The analysis of which returns the table;

```

Call:
glm(formula = Seed_Capital ~ Patent + Fulltime_Employees + TMTEducation_Master +
    TMTEducation_Master:Fulltime_Employees, family = binomial,
    data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.5210  -0.8188  -0.3929   0.7056   1.7130

Coefficients:
                Estimate Std. Error z value Pr(>|z|)
(Intercept)         5.4164     2.4333   2.226  0.0260 *
Patent              -0.3072     0.2133  -1.440  0.1498
Fulltime_Employees  -0.7544     0.4096  -1.842  0.0655 .
TMTEducation_Master -2.4053     0.9858  -2.440  0.0147 *
Fulltime_Employees:TMTEducation_Master  0.3175     0.1651   1.923  0.0544 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 49.961  on 36  degrees of freedom
Residual deviance: 37.604  on 32  degrees of freedom
(3 observations deleted due to missingness)
AIC: 47.604

Number of Fisher Scoring iterations: 7

```

Figure 8: Results table (Prop 2b)

I observe that at 95% significance level, an entrepreneurial venture with a patent having more full time TMT with more Master graduates will have an 91% increase of getting seed capital. I also observe a confounding effect of full time employees having a master's degree at a significance level of 90% which may show a limitation on the number of full time employees having a master's degree that can be employed.

Proposition 2e: Effect of cumulative industrial experience and number of TMT members on seed capital

In proposition 2e, I check the how an entrepreneurial team of TMT members having vast industrial experience would affect the probability of new venture's acquisition of seed capital. This hypothesis is premised on the assertion that ones industrial experience carries with it social capital critical to accumulation and bootstrapping of scarce organizational resources fundamental to new venture formation. The industrial experience as considered cumulative and as such the more the TMT members with vast industrial experience the higher the effect. Empirical analysis of the proposition returns the table;

```

Call:
glm(formula = Seed_Capital ~ Industrial_Experience_Cumulative^2 +
    TMT_members + Industrial_Experience_Cumulative:TMT_members,
    family = binomial, data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.351  -1.056  -0.781   1.282   1.793

Coefficients:
                Estimate Std. Error z value Pr(>|z|)
(Intercept)      2.376428   1.813272   1.311   0.190
Industrial_Experience_Cumulative
-0.033361    0.034322  -0.972   0.331
TMT_members     -0.892792   0.521707  -1.711   0.087 .
Industrial_Experience_Cumulative:TMT_members  0.011357   0.008474   1.340   0.180
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 54.548  on 39  degrees of freedom
Residual deviance: 50.656  on 36  degrees of freedom
AIC: 58.656

Number of Fisher Scoring iterations: 4

```

Figure 9: Results table (Prop 2c)

At significance level of 90%, an entrepreneurial team with a TMT members having considerable industrial experience will have a 59% increase of obtaining seed capital.

Proposition 3a: Effect of the number of employees and patent on seed capital

In proposition 3a, I check for the effect of an entrepreneurial team with more full time employees on the likelihood of making a technology break through for which prior research posits that is associated to accumulation of financial resources in this case seed capital. This hypothesis based on the account that firm's success hinges on firm's knowledge base, ability to integrate and deploy this resource for commercial rent. With patents as precursor to future scientific developments and consequential commercial success. And as such the number of full time employees implicitly indicating the commitment of the team towards the endeavor. Empirical validation of this hypothesis results in the table below;

```

Call:
glm(formula = Seed_Capital ~ Patent + Fulltime_Employees + Patent:Fulltime_Employees,
     family = binomial, data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.3948  -0.9375  -0.7649   1.0727   2.1167

Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)    0.84231    0.77460   1.087  0.2769
Patent        -0.42507    0.24877  -1.709  0.0875 .
Fulltime_Employees -0.17222    0.12837  -1.342  0.1797
Patent:Fulltime_Employees 0.03947    0.02363   1.670  0.0949 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 54.548  on 39  degrees of freedom
Residual deviance: 48.455  on 36  degrees of freedom
AIC: 56.455

Number of Fisher Scoring iterations: 6

```

Figure 10: Results table (Prop 3a)

At significance level of 90%, the model shows that indeed an entrepreneurial team with more full time employees will have a technology break through that improves their likeliness of acquiring seed capital by 34.6%. There is a limit to the interaction of technology breakthrough with the number of full time employees significant at 90% level which may indicate that beyond a certain number of full time employees, the venture may not be able to make a patent critical for acquisition of seed capital.

Proposition 3b: Effect of team education, number of employees and patents on seed capital

In proposition 3b, I investigate the effect of an entrepreneurial team with more master graduates on full time on the new venture's likelihood of making a technology breakthrough which is fundamental to obtaining seed capital. The proposition holds that high technology ventures are built around the founding team who possess technical expertise behind the technology. Knowing that firm's patents are signal to the depth of firm's core scientific and engineering resource as well as a source of income to new venture, I predict that financial resource holders will be driven to invest in such new enterprise thereby obtaining seed capital. The empirical analysis of the proposition results in the table below;

```

Call:
glm(formula = Seed_Capital ~ Patent + Fulltime_Employees + TMTEducation_Master +
    Patent:Fulltime_Employees, family = binomial, data = seedcapdata)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.3953  -0.8992  -0.5022   0.9130   1.7108

Coefficients:
                Estimate Std. Error z value Pr(>|z|)
(Intercept)      2.34920    1.29206   1.818  0.0690 .
Patent           -0.43494    0.25469  -1.708  0.0877 .
Fulltime_Employees -0.16991    0.12610  -1.347  0.1779
TMTEducation_Master -0.75525    0.45704  -1.652  0.0984 .
Patent:Fulltime_Employees 0.05269    0.02592   2.033  0.0421 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 49.961  on 36  degrees of freedom
Residual deviance: 41.052  on 32  degrees of freedom
(3 observations deleted due to missingness)
AIC: 51.052

Number of Fisher Scoring iterations: 6

```

Figure 11: Results table (Prop 3b)

Results show that at 95% significance level, the number of full time employees has strong confounding effect on the number of patents generated by TMT with more Master graduates. At significance level of 90%, the hypothesis returns a probability of 35.3% that a team with more full time TMT Master graduates making a technology breakthrough will get seed capital. There is boundedness of the interaction of patents with number of full time employees.

5.0 DISCUSSION

The fundamental assumption this paper holds by the fact the sample survey were technology based startups is that the business idea or the science of the technology is attractive. And as a result resource holders (seed capital investors) look to the firm's initial endowments to measure its ability to not only develop the technology but also take product to market. Consequently, seed capital investors look to a set of resources they regard critical for the success and prosperity of a new venture including the entrepreneur, entrepreneurial team, team atmosphere, geographical proximity to knowledge sources, proprietary knowledge, inter-organization cooperation and so forth. I note that the evaluation of new venture is guided by due diligence template for which the firm resource are ranked. The most successful of the startups may be one that scores relatively high on all measures of firm resources and as such I,

use resource interaction to identify some of the critical resource combination that may incline firms towards seed capital acquisition and consequently resource accumulation.

For the purpose of this research, I have tested the effect of intellectual property strategy, inter-organizational cooperation from a competitor perspective, entrepreneurial team characteristics including education, functional diversity, cumulative industrial and entrepreneurial leadership experience.

Inter-organizational Cooperation

This research has to an extent proved that inter-organization cooperation is associated with access to complementary resources which often indirectly endow a myriad of opportunities to new venture firm. Partnership with prominent industrial competitor may draw attention to new startup as influential industrial players are often the nucleus of industrial activity and business press, as such an alliance with high status competitor is not only an endorsement but a precursor to valuable resources. Inter-organization cooperation by new venture with established industrial competitor or institution may influence perception of venture quality, reliability and trustworthiness of the entrepreneur and team. This in turn offers legitimacy to the entrepreneurial venture and may more likely sway better judgment on the part of resource holder in the course of due diligence. By proposition 1a, I, affirm that indeed in the cases of uncertainty in the quality of new venture and credibility of the prospective entrepreneur, seed capital investors may assess the identity and characteristics of the startup's exchange partners to forecast the performance and innovative signal. However, I, observe the assessment of partnership does crucially hinge on the entrepreneurial team's educational competence.

Entrepreneurial Team

Some resource investors have proclaimed to invest in people thereby accentuating the significance of entrepreneurial team. As such the resource holder's appraisal of an entrepreneurial team, they may consider vital characteristics that team easily radiate for example, entrepreneurial leadership experience, prior founding experience, industrial experience, team education, functional diversity etc. In this research, I attempt to empirically verify the effect of all above, except one's prior founding experience, on seed capital acquisition.

Functional diversity of entrepreneurial team

Some researchers have highlighted that one of critical limitation of entrepreneurs is that they are very highly specialized within a particular science or technical field as such short on market and commercial cognition crucial for user friendly product development. Thereby positing that functional diversity of the entrepreneurial team will go along way in smoothening the new product process. They argue that entrepreneurial teams diverse in training, functional and work backgrounds are likely to have deeper knowledge bases and cognition. Cognition epitomizes ones inference, intuition and sense making and as such diverse teams are better at opportunity recognition and problem solving capabilities relevant to innovation. This founded on the assumption that diversity in team may precipitate into deeper absorptive cognition and heuristic based logic. However, empirical analysis of proposition 2a and 2b has shown that teams with deeper functional diversity as regards to commercial or marketing as compared to there other diversity (engineering, R&D, operations) will least likely guarantee acquisition of seed capital. This in part may be due to the least appreciation of marketing function within the early stages of the lifecycle of research based startups. Research based startups for the most part of their early life are more research driven trying to develop the first prototype. Even so is the fact that seed financing is for bigger part directed to funding research activities and as such resource investors are least interested in the team members with marketing background. However, some human capital researchers have argued that this may be due to the fact entrepreneurs tend to hire people of a like – just as is that birds of a feather flock together.

Leadership experience

It has been argued that leadership experience is an indicator of entrepreneur's specific human capital and that it not only informs judgment in the event of uncertainty but also does carry with social capital essential for resource accumulation with some researchers arguing that financial investors rate top management skills highly. In proposition 1b and 1c, empirical analysis has shown that leadership experience has an effect on team atmosphere within which entrepreneurial team operates and eventual acquisition of seed capital. This may be due to the fact that entrepreneurial cognitive learning through experimentation and exploitation informs one's heuristics on the value of resources and thereby enhancing the entire entrepreneurial process right from opportunity recognition through to coordination of knowledge resources

for which team environment (atmosphere) is vital to team motivation. Through their social capital and preceding reputation, entrepreneurs with vast leadership experience are able to bootstrap resources fundamental to new venture formation. And such an entrepreneur who radiates such capabilities is more likely to attract external resources.

Team education

Many researchers using the knowledge theory affirm that level of team education has a positive correlation to resource development. This is premised on the long held assumption that entrepreneurial learning process is critical to entrepreneurial cognition development which involves creating new and deeper understanding, interpretation and insights into subjects and events with some entrepreneurial science authors contending that a firm's competitive advantage evolves around knowledge creation and decision making capabilities that may result from the rare entrepreneurial insights and ideas reached as consequence of higher learning. In proposition 2c and 2d, I find that an entrepreneurial venture in possession of a patent having a team of highly educated researchers will more likely obtain seed capital. This may be in part due to presumption that such a team has the technical capacities to exploit the patent to its full commercial value. In proposition 2d, I find the education level of the in-house staff – the number of full time employees for a venture having a patent is critical to assess of seed capital. This may be due to level of commitment and team motivation demanded by seed capital investors. I find that a team having more TMT with master graduate education on full time basis is more likely to acquire seed capital.

Intellectual Capital strategy

Its common sight that research based startups is built around an entrepreneurial team that possesses technical expertise behind a particular technology. This is because they have the ability to recognize external information and assimilate it for commercial reward as such entrepreneurial venture's absorptive capacity is critical to realizing technology breakthrough and eventual development of an intellectual property strategy. Resource holders will more likely to invest in an entrepreneurial venture in possession of a patent as this will not only signal the firm's innovation capability but also the technical acumen of the entrepreneurial team. In proposition 3b, I have found that a team having full time technical skilled members will more likely make a technology break through that enhances its probability of accessing

seed capital. This is true since knowledge fills a large brain and inflates a small one; as such an entrepreneurial team with deeper cognitive abilities and absorptive capacities is more likely pick hugely dispersed chaotic pieces of information that may be critical to next big invention. In proposition 3a, I find that critical to technology breakthrough is the commitment of the entrepreneurial team as such the number of full time employees pursuing any given endeavor will more likely have access to seed capital. This is probably due to the determination and motivation of the team for which the financial investors considers and as such before the prospective investor, the team appears result oriented.

5.1 Limitation of this research

The sample size used in this survey is relatively small to significantly deduce with certainty the hypothesis proposed, however, I use a significance level of 90% to assert that a majority of the hypothesis is verified.

For a fact, seed capital firms not only in Norway but also across Europe have investment areas for example *Sarsia Seed Capital* is focused on Biotechnology, Oil and Gas and Clean technology and as such the effect of industrial sector in which the firm operates is not tested because the sample is so small for each of the industries to make assertion. Yet again, for some industrial sectors especially information technology where the speed of technology obsolescence is so fast that the process of patenting may not be of commercial value, proposition 3a and 3b needed to be tested on the moderating factor of industry, which is not possible for this research.

This research attempts to empirically validate the proposition that new technology based venture's cooperation with established competitors will guarantee access to seed capital. There is considerable literature on the subject of inter-organization cooperation; however, there is limited empirical evidence to measure the degree to which new ventures as well as their partners do cooperate. In the survey used for purposes of this research, the question was restricted to testing whether new technology based ventures cooperate with established competitors or not. As such there is a research gap in the subject of inter-organizational relations as regards to the extent with which new enterprises will cooperate with competitors.

This research attempts to answer the research question, '*How do firm resources influence a new entrepreneurial venture's probability of obtaining seed capital?*' from the resource demand side. The implication to this is that I develop a theoretical framework used for proposition in consideration of the entrepreneur and entrepreneurial venture's resources which may not be valid from the resource supply side. This is a result of the fact that survey sample comprised of technology startups. However, with a survey sample comprising of business angels, government innovation driven institutions and seed capital firms, there may be a different insight into the fundamental frameworks used in the due diligence of the startups. With this research limited to resource demand side, further research could be carried out to investigate the research question from resource supply side and identify how the theoretical framework on to which firm's resource propositions are developed in the course of due diligence by the investors. Critical to further research is the source of seed financing availed to the startups as it's essential to distinguishing their influences on the framework.

6.0 CONCLUSION

Critical to new venture's accumulation of scarce resources is its initial resource endowments including the entrepreneur's reputation and experience, intellectual capital strategy, entrepreneurial team education and commitment, inter-organization cooperation. For the very nature of new startup, they suffer from the effects of liability of newness and smallness and as a consequence, the accumulation of resources fundamental for their survival and growth is inherently a social endeavor. It's thus, imperative that prospective entrepreneurs and new venture firms seeking external resources nurture a combination of social, human and technological capital.

Technology based startups for the best part of their early life cycle are research and development driven and as such the effect of functional diversity of the entrepreneurial team is not quite appreciated by the both the entrepreneurs and seed investors even when existing literature has argued for the benefits of diversity as regards to entrepreneurial cognition. However, understanding its effect with regard to industry may go along way in defining the best function diversity configuration for a given entrepreneurial team.

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